Compilation of the EarthScope publications database

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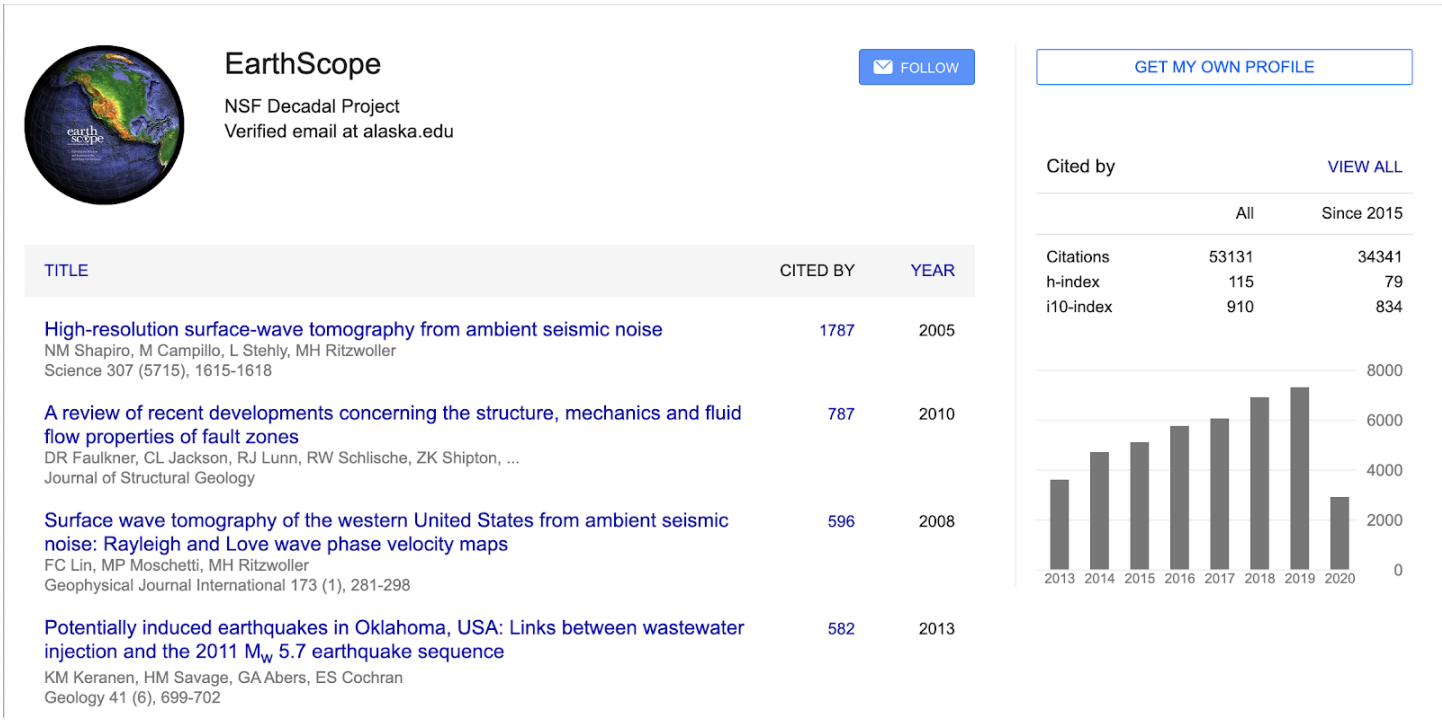
Attribution: This report is part of a Scholarworks@UA (https://scholarworks.alaska.edu/) collection entitled “EarthScope publications database”. It was prepared for final reporting on the National Science Foundation project EAR-1464674 (EarthScope National Office), led by Jessical Larsen (final PI), Jeffrey Freymueller (original PI), David Fee, Carl Tape, and Elisabeth Nadin.

Set of files included in Scholarworks@UA collection

1. earthscope_bibliography_report.pdf -- this file
2. citations_20200510.csv -- csv text file exported from Google Scholar
3. earthscope_publications.ipynb -- Jupyter python notebook to export csv file from Google Scholar

EarthScope Google Scholar Profile: https://scholar.google.com/citations?user=ZKI-0gUAAAAJ&hl=en&authuser=3

Google Scholar page (May 11, 2020)



EarthScope

NSF Decadal Project
Verified email at alaska.edu

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TITLE	CITED BY	YEAR
High-resolution surface-wave tomography from ambient seismic noise NM Shapiro, M Campillo, L Stehly, MH Ritzwoller Science 307 (5715), 1615-1618	1787	2005
A review of recent developments concerning the structure, mechanics and fluid flow properties of fault zones DR Faulkner, CL Jackson, RJ Lunn, RW Schlische, ZK Shipton, ... Journal of Structural Geology	787	2010
Surface wave tomography of the western United States from ambient seismic noise: Rayleigh and Love wave phase velocity maps FC Lin, MP Moschetti, MH Ritzwoller Geophysical Journal International 173 (1), 281-298	596	2008
Potentially induced earthquakes in Oklahoma, USA: Links between wastewater injection and the 2011 M_w 5.7 earthquake sequence KM Keranen, HM Savage, GA Abers, ES Cochran Geology 41 (6), 699-702	582	2013

Cited by VIEW ALL

	All	Since 2015
Citations	53131	34341
h-index	115	79
i10-index	910	834

Figure 1. Screenshot from the EarthScope google scholar profile, taken on May 11, 2020. The citation metrics and numbers will change with time, even if no additional papers are added to the google scholar profile.

Introduction

The goal of the EarthScope publication database is to provide as complete a scientific record as possible of scientific publications that used EarthScope data. EarthScope data includes seismic data, geodetic data, infrasound data, magnetotelluric data, SAFOD products (San Andreas Fault Observatory at Depth), and geochronology data via the AGeS (Awards for Geochronology Student research) program. In general terms, “EarthScope” has three parts:

1. the facilities to collect data (USArray, Flexarray, SAFOD)
2. the NSF EAR program to fund scientific projects (culminating in solicitation NSF 17-511)
3. the EarthScope National Office, funded to facilitate education and outreach of EarthScope science (including the biennial EarthScope National Meeting, last held May 2017 in Anchorage, Alaska).

This report is a product of the National Office, covering scientific research on EarthScope data, whether or not the project itself was funded under the NSF EarthScope program.

The EarthScope bibliographic database is the culmination of a near-constant effort of the EarthScope National Office, which initiated at Oregon State University, then transferred to Arizona State University, before transferring to UAF for its final tenure from 2014–2019. Many previous students were involved in this effort and are not acknowledged here. The UAF effort benefited most recently from the efforts of Rebecca deGraffenreid and Connor Drooff, which were carried forward by Nealey Sims and Keir Tasa in 2019–2020.

The EarthScope publications database is a google scholar profile (see link above) that was constructed through manual entering and review of papers that were already present in google scholar. The main task was to assess whether each candidate paper used EarthScope data; if it did, it was added to the EarthScope google scholar profile.

Publications using EarthScope data will continue to grow, however they will not be entered into the google scholar profile unless someone resumes our effort. Our last search was performed on May 11, 2020.

Section 1: Approach to finding articles

Here we provide details on how we searched for EarthScope papers to add to the bibliographic database. In our efforts, we found that searching google scholar alone did not display all the articles; for this, we needed to search individual journals.

Procedure for searching for ES papers

1. google scholar -- type in key words one at a time
    a. check if article title or abstract meet criteria
        i. If yes, select “add to profile” if paper not in Google scholar
    b. If not, open the paper and check if Methods/Data meet criteria
    c. If not, look in “Acknowledgements” section for Earthscope related funding
2. specific journals -- type in keywords (multiple at a time if Advanced search options permit multiple phrases)
    a. check if article title or abstract meet criteria
        i. search ES google scholar profile by title to see if it is already added and add if not
    b. If not, open the paper and check if Methods/Data meet criteria
    c. If not, look in “Acknowledgements” section for Earthscope related funding

Keywords used in search procedure for Google Scholar and each journal

- Earthscope
- Transportable Array (TA is too vague)
- USArray
- Plate Boundary Observatory (don't use PBO, you'll get a bunch of papers that mention PbO)
- Earthscope MT (MT = magnetotellurics)

- SAFOD
- FlexArray
- AGeS AGeS1 geochronology

Journals searched individually

- Earth and Planetary Science letters (searched via EPSL website)
- Seismological Research Letters (searched via geoscienceworld.org)
- Bulletin of Seismological Society of America (searched via geoscienceworld.org)
- AGU journals (searched via agupubs)
    - Geophysical Research Letters
    - Journal of Geophysical Research
    - Geochemistry, Geophysics, Geosystems
    - what else?
- Science
- Nature
- Nature Geoscience
- Scientific Reports
- Scientific Advances
- PNAS: Proceedings of the National Academy of Sciences
- Geology

Useful sites:

- List of operating USarray stations: http://www.iris.washington.edu/ds/nodes/dmc/earthscope/usarray/ALL-operational/
- List of earthscope arrays: https://www.earthscope.org/sites/default/files/2016-11/2016_09_07_Flex%20Array%20Map_0.pdf

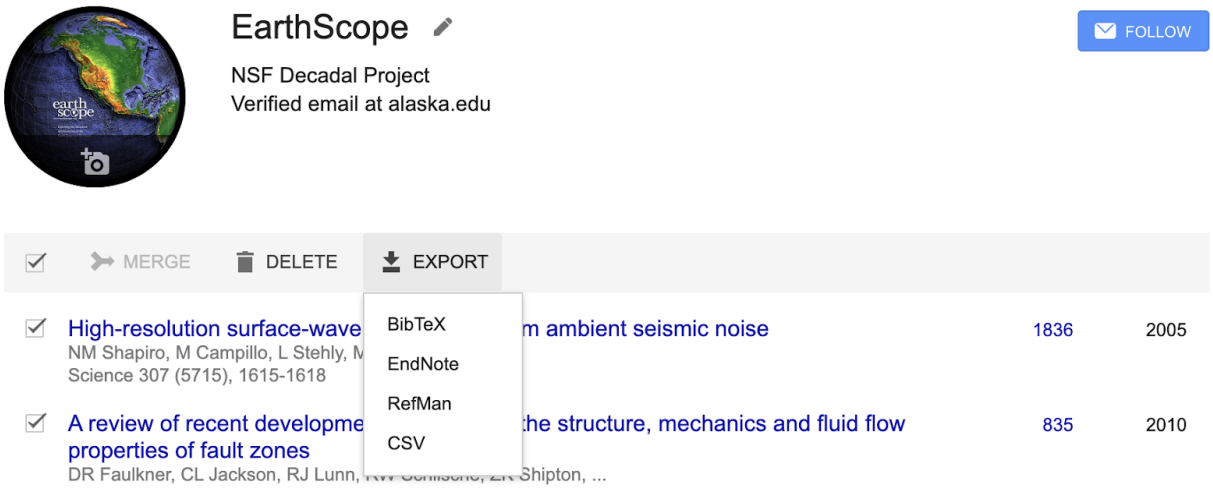
The EarthScope National Office wrote 76 “Science Nuggets” covering different projects, each of which had EarthScope publications associated with it. The Science Nuggets can be accessed from the EarthScope website from here:
https://www.earthscope.org/results
or on the flyover app here:
https://flyovercountry.io/
To find the Science Nuggets within the Google Scholar database, sort the Google Scholar entries by title and scroll down to entries that begin with the words “Earthscope Nugget”.

Section 2: Presentation of bibliographic database

Option A: browse dynamic content in google scholar. The content is dynamic in the sense that citation metrics for the EarthScope google scholar profile and for each paper will change with time, as new papers cite the listed papers. However, the number of papers in the EarthScope google scholar profile is static in the sense that no new papers will be added.

Option B: Explore the content using the CSV text file exported from Google Scholar. The steps to export citations_20200510.csv are:

- Login to uaf-earthscope@alaska.edu account
- click “My Profile”
- Check box to select all articles (see image below)
- Export CSV
- Export all articles



The CSV file provides flexibility for analyzing the database. For example, to make figures below or determine specific metrics such as # of unique authors, # of journals, # of publications by year, etc. we use the jupyter notebook file earthscope_publications.ipynb which can be found in the Scholarworks collection.

Section 3: Analysis of database

Here we present summary figures derived from our final text database file. This conveys the breadth and impact of EarthScope research, as well as highlighting the most prevalent journals for EarthScope research.

summary text of the database (on May 11, 2020)

1. 1491 papers, 1456 unique authors, 122 journals (Figures 2, 3, and 4)
    a. note: this content will **not** change with time
2. number of papers citing ES papers overall (Figure 1: 53,131) and per year (Figure 5)
    a. note: this content will grow with time
3. ranking of journals with >=10 publications and their number of publications (see Appendix for additional journals):

JGR	249
GRL	217
EPSL	132
BSSA	131
SRL	121
GJI	86
GGG	54
Geology	47
Eos	27
Tectonophysics	23
Nature	22
Geosphere	19
Nat Geo	19
Science	17
PEPI	16
JSG	14
Lithosphere	11
Tectonics	11
Space Weather	10

4. subset of papers in high-impact journals (Science, Nature, Nature Geoscience)
   58 papers in these journals total
5. use as many google scholar metrics as possible

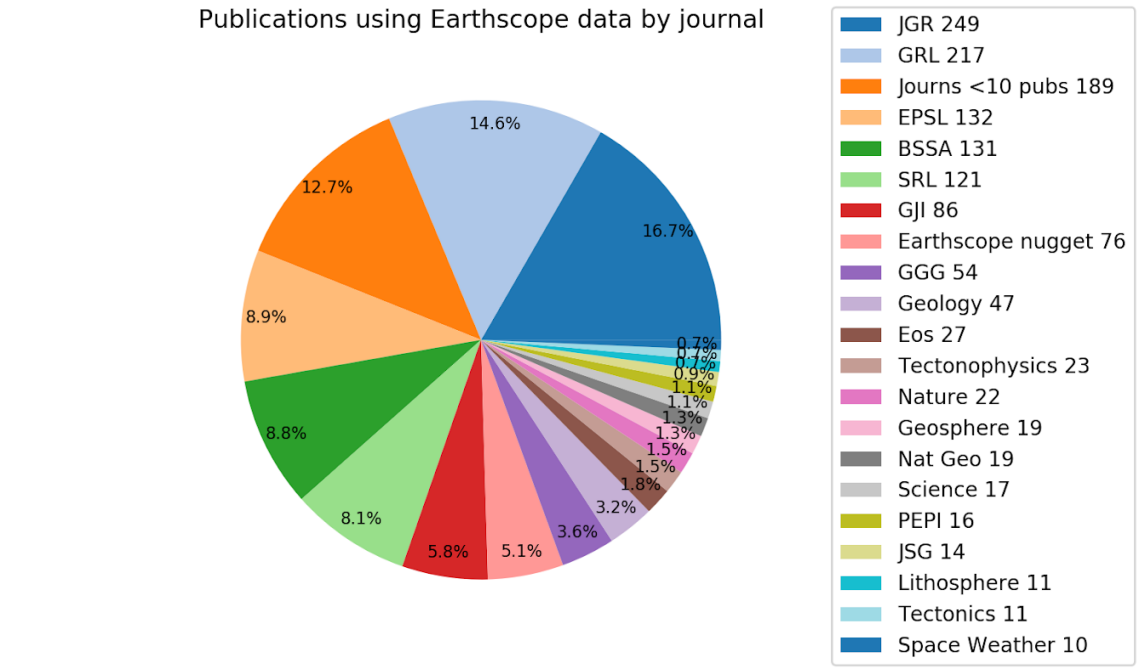


Figure 2. Pie chart showing the number of articles each journal published in our database. Journals that published fewer than 10 articles that used EarthScope data are grouped into one category (dark orange). “Earthscope nugget” refers to 76 science nuggets that link to the EarthScope website. Percentages in the pie chart refer to the fraction of articles in the database that were published in each journal.

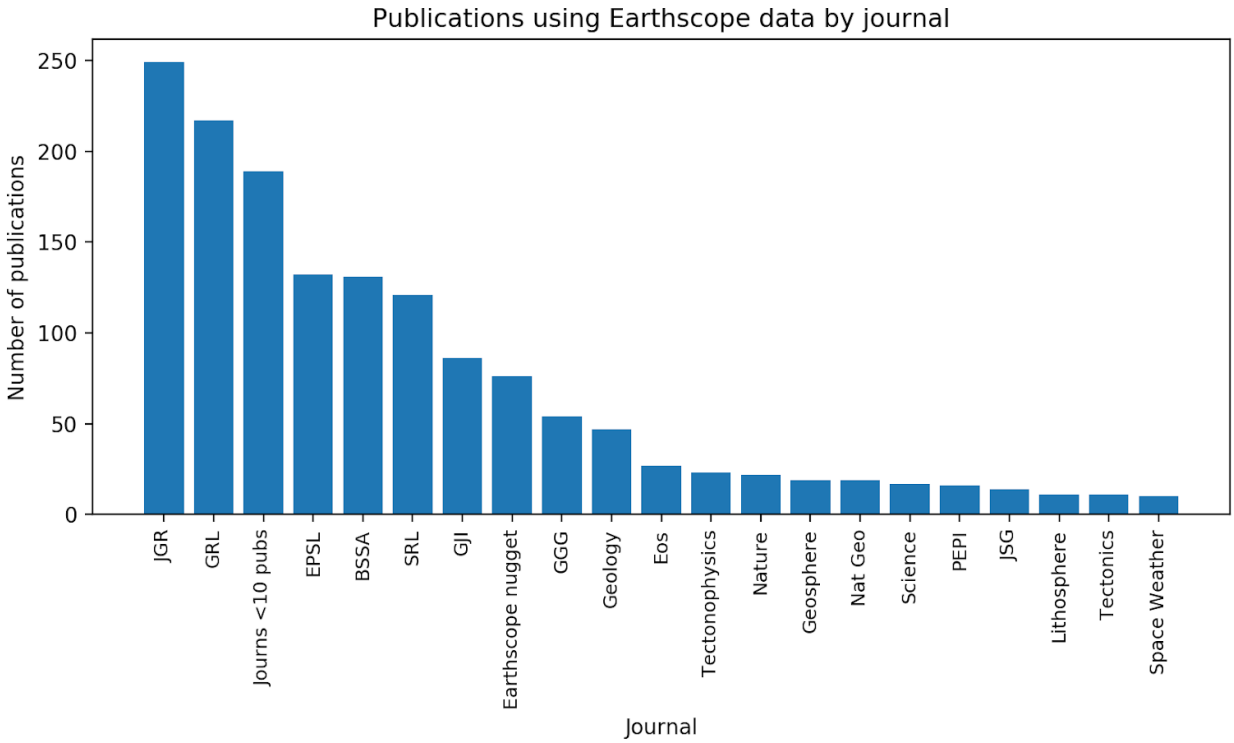


Figure 3. Bar graph showing the same data as Figure 2. Journals that were searched individually are listed in the text above.

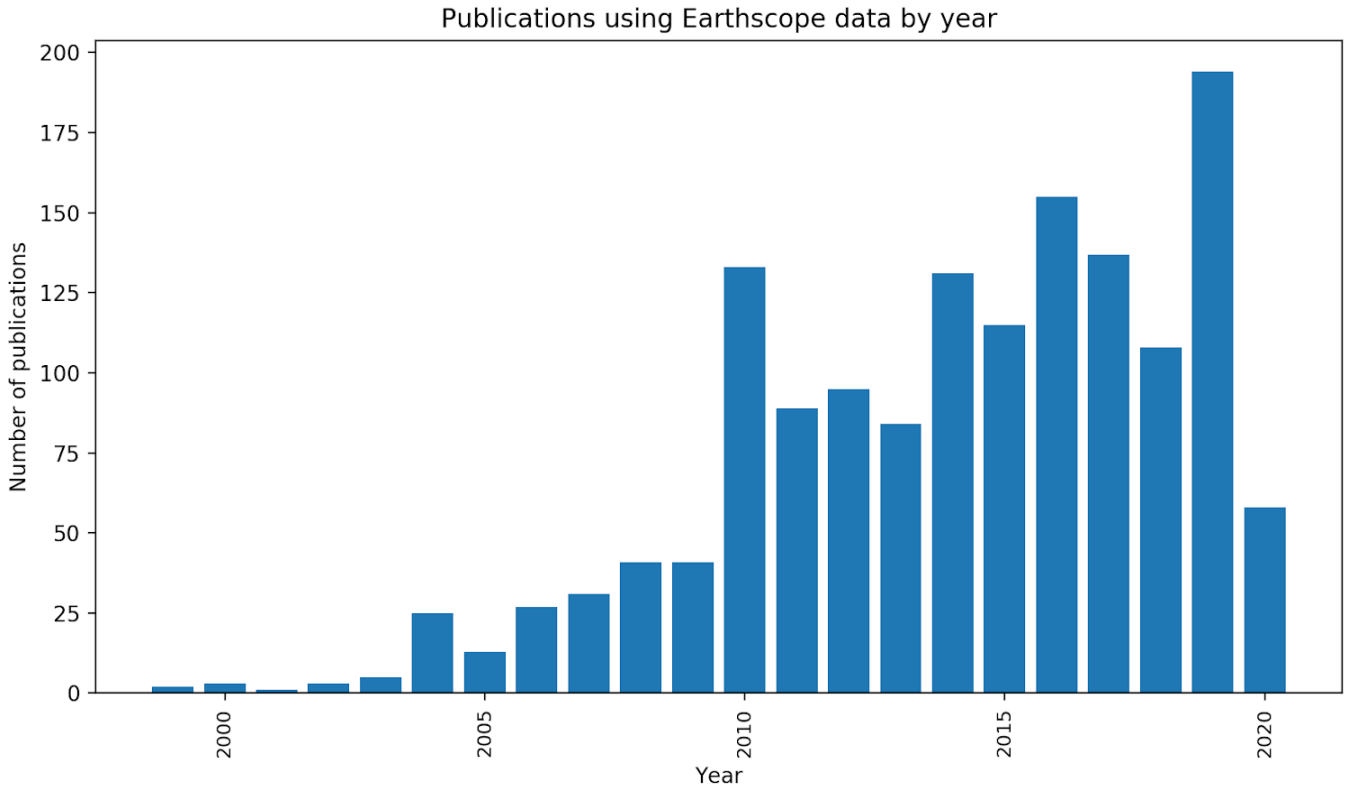


Figure 4. Bar graph of the number of publications that used EarthScope data for each year since it began and up through spring 2020.

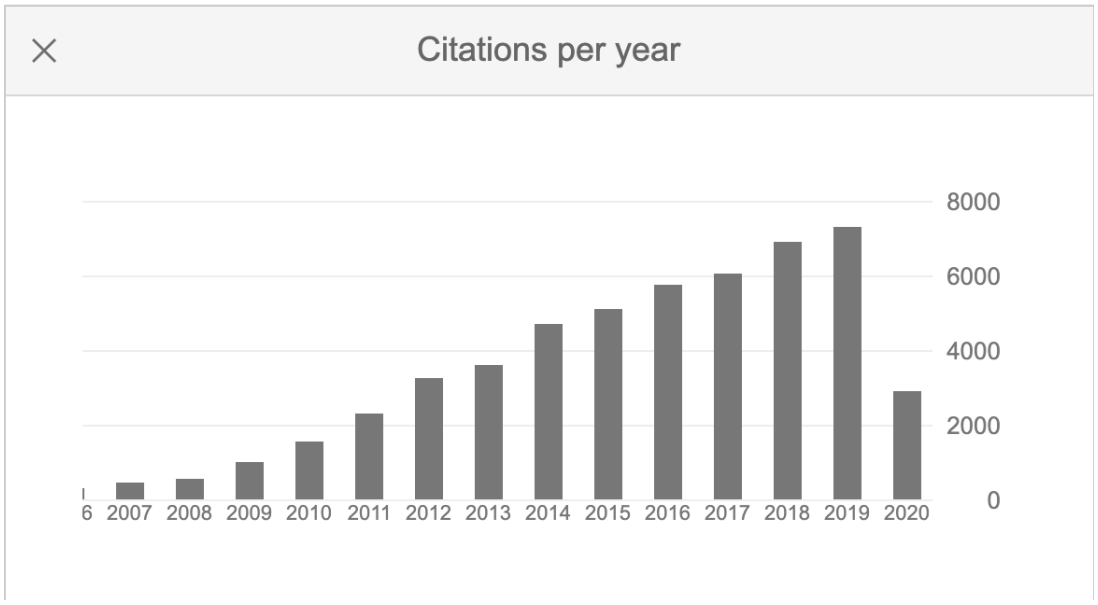


Figure 5. Screenshot from the EarthScope Google Scholar page that shows how many citations of Earthscope related articles were made each year.

Section 4: Future updates to the database

EarthScope data are still being acquired, as evidenced from Transportable Array seismic stations still in operation in Alaska (Figure 6). Furthermore, projects are still underway which use previously recorded EarthScope data. In order to document the complete scientific impact of EarthScope, one might want to revisit our effort and update the database. Here we have provided scripts and documentation to facilitate such an effort.

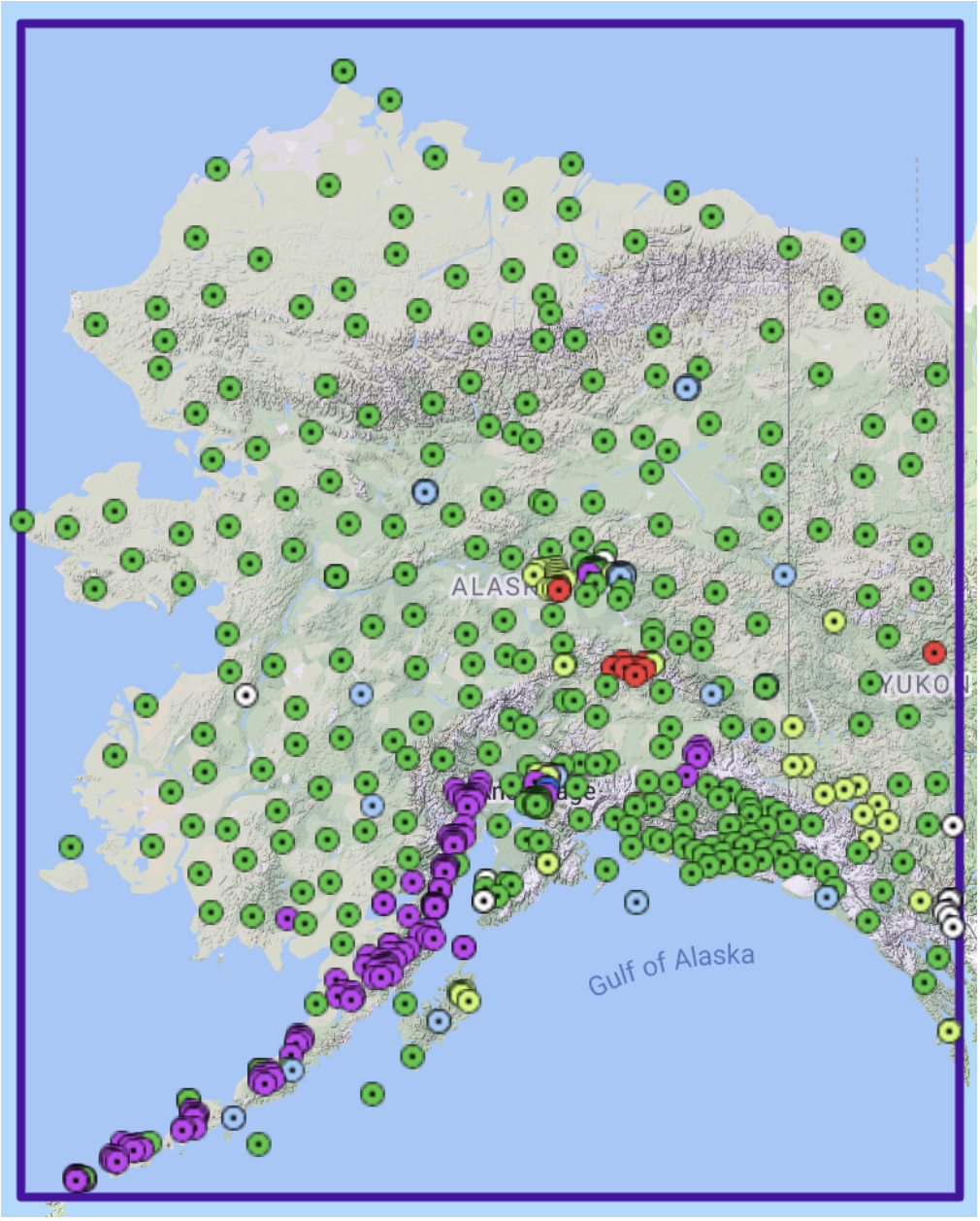


Figure 6. Screenshot of broadband seismic stations in Alaska on August 4, 2020, from the IRIS GMAP tool (link below). A large number of these stations are from the TA (EarthScope) seismic network and are scheduled for removal in 2021. With stations still recording data, one would expect additional EarthScope science papers to follow.
http://ds.iris.edu/gmap/#starttime=2020-08-04&endtime=2020-08-04&maxlat=72&maxlon=-135&minlat=54&minlon=-168&network=*&drawingmode=box&planet=earth

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Appendix: Journals with <10 EarthScope publications (as of May 11, 2020)

Nat. com. 9
EPS 8
Pure & App. Geophys. 8
Proceedings of the National Academy of Sciences 7
Sci. Reps. 7
Comps. & Geos. 6
JVGR 5
Leading Edge 5
Sci. Drill. 5
Advances in Space Research 4
IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing 4
Journal of Geoscience Education 4
Science advances 4
Geological Society of America Special Papers 3
Geophysical Supplements to the Monthly Notices of the Royal Astronomical Society 3
Geothermics 3
Journal of Geodynamics 3
Nature News 3
GPS solutions 2
GSA Today 2
Geophysics 2
Infrasound Monitoring for Atmospheric Studies 2
International Journal of Greenhouse Gas Control 2
Izvestiya, Physics of the Solid Earth 2
Journal of Seismology 2
Monthly Weather Review 2
Natural Hazards 2
Remote Sensing 2
Remote Sensing of Environment 2
Reviews of Geophysics 2
Solid Earth 2
The Journal of the Acoustical Society of America 2
92nd American Meteorological Society Annual Meeting 1
AAPG Bulletin 1
AAPG bulletin 1
AIMS GEOSCIENCES 1
Acta Geophysica 1
Advances in Geosciences 1
Analysis, Modelling, Optimization, and Numerical Techniques 1
Annual Review of Earth and Planetary Sciences 1
Astronomy & Geophysics 1
Atmospheric Measurement Techniques 1
Bulletin of the American Meteorological Society 1
CHINESE JOURNAL OF GEOPHYSICS-CHINESE EDITION 1
Canadian Journal of Earth Sciences 1
Chemical Geology 1
Comptes Rendus Geoscience 1
Contemporary Physics 1
Contributions to Mineralogy and Petrology 1
Data Science Journal 1

Developments in Structural Geology and Tectonics 1
Earth 1
Earth-Science Reviews 1
Earthquake Science 1
Earthquakes: Radiated Energy and the Physics of Faulting 1
Earthscope on Site Newsletter 1
Environmental & Engineering Geoscience 1
Extreme Events in Geospace 1
Future Generation Computer Systems 1
GEOPHYSICAL MONOGRAPH-AMERICAN GEOPHYSICAL UNION 1
GRC Transactions 1
Geol. Spec. Publ. 1
Geological Society of America Bulletin 1
Geological Society of America TODAY 1
Geomagnetically Induced Currents from the Sun to the Power Grid 1
Geoscience Data Journal 1
Geotectonic Research 1
Geotimes 1
Gondwana Research 1
Hydrogeology journal 1
Interpretation 1
J. Geol. Geosci 1
Journal of Asian Earth Sciences 1
Journal of Atmospheric and Oceanic Technology 1
Journal of Geodesy 1
Journal of Sedimentary Research 1
Journal of hydrometeorology 1
Liberal Education 1
Open Journal of Earthquake Research 1
Ore Geology Reviews 1
Outcrop 1
Physics today 1
Precambrian Research 1
Quaternary Geochronology 1
Renewable energy 1
Reports on Progress in Physics 1
Russian Journal of Earth Sciences 1
SPE Annual Technical Conference and Exhibition 1
Scientific American 1
Scientific data 1
Technology in Society 1
The Chile-2015 (Illapel) Earthquake and Tsunami 1
The Earth Scientist 1
The Interdisciplinary Earth: In Honor of Don L. Anderson 1
The Journal of Navigation 1
The Science Teacher 1
The Sedimentary Record 1
US Geol. Surv. Final Tech. Rept. Award Number G14AP00110 1
WIREs Water 1
Washington DC American Geophysical Union Geophysical Monograph Series 1
Water Resources Research 1
Weather and Forecasting 1